Convolvulus pluricaulis: Traditional Use and Modern Scientific Insights

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Abstract

Convolvulus pluricaulis, commonly known as Shankhpushpi, is a well-recognized ayurvedic herb belonging to the family Convolvulaceae, traditionally used to manage neurological and psychological ailments. This comprehensive review explores its botanical characteristics, cultivation practices, therapeutic uses, and pharmacological properties. Cultivated in semi-arid regions with minimal agronomic input, *C. pluricaulis* thrives in sandy soils under full sunlight. The plant exhibits a wide range of bioactivities including neuro-protective, antioxidant, anti-inflammatory, anxiolytic, antidepressant, antiepileptic, hepatoprotective, antimicrobial, and cardiovascular effects. Bioactive compounds such as convolamine, β-sitosterol, valeric acid, squalene, and ascorbic acid contribute to its pharmacological potential. Empirical data from various preclinical and clinical studies support its traditional use, particularly in managing anxiety, depression, cognitive dysfunction, and oxidative stress. This review underscores the need for further mechanistic and clinical studies to fully elucidate its therapeutic efficacy and safety profile.

***Keywords**: Convolvulus pluricaulis*; Shankhpushpi, neuroprotective, antioxidant,Anxiolytic, cognitive enhancement; traditional herb; pharmacological activity

Introduction

Convolvulus pluricaulis this is the old herbal drug, and these are generally used for treatment of the mental health disorder. *Convolvulus pluricaulis*, a member of the Convolvulaceae family, is also referred to as Shankhpushpi in certain Indian

languages. Shankhpushpi is a highly prized plant because of its potent therapeutic properties and distinctive scent. Fresh Shankhpushpi plants produce a pale-yellow oil through steam distillation and have a distinct smell. It is frequently referred to as morning glory.1It grows and is widely dispersed over northern India, including Punjab, Bihar, and Chhota Nagpur. The whole plant's methanolic extract lowers total serum cholesterol, phosphatide, and free fatty acids while also having an anxiolytic effect. Autumn herb blooms range in color from white to pale pink.

Shankhpushpi is regarded as a highly significant herb in Ayurveda. Learning, memory, and behaviour are improved. The roots of the Shankhpushpi plant are used to treat infantile fever, the leaves are traditionally used to treat asthma and chronic bronchitis, and the plant itself encourages hair development it aids in nourishing the skin while enhancing its appearance. The herb's antifungal, antibacterial, antidepressant, antiulcer, antistress, antipyretic, and anthelmintic properties have been discovered through research. As to how beneficial it is in reducing the symptoms of an overactive thyroid. Fever and also used as an alternative tonic for the brain that increases mental alertness, substitutes, and is commonly used to treat weakness, insomnia, weariness, low energy, and gastric mucosa ulcers. Studies on the pharmacological properties of the Shankhpushpi plant have shown that it has sedative and blood pressure-lowering properties. Studies in the clinical setting have shown beneficial outcomes for individuals with anxiety disorder. The plant Shankhpushpi is non-poisonous and does not cause any adverse effects. Conversely, it might cause one to feel more robust, healthy, and energized while simultaneously gaining weight. *Convolvulus pluricaulis choisy* is a common plant found throughout northern India that is employed as a medicinal agent in Ayurvedic medicine. *Convolvulus pluricaulis* is also known for its ameliorative effect on neurodegenerative diseases like Alzheimer's disease. *Convolvulus pluricaulis* entire extracts have also been demonstrated to be efficacious against a range of pathologic or sub-pathologic diseases, including ulcers, bacterial and viral infections, and liver toxicity, in both in vitro and animal models.1-3

The focus of *Convolvulus pluricaulis* research lately has been on its function in lipid control. Generally, in in vivo models of diabetes and hyperlipidemia. In fact, *Convolvulus pluricaulis* methanolic extract has been demonstrated to be beneficial in controlling a number of lipid characteristics. In an animal model of hyperlipidemia and to exhibit notable hypolipidemic effects in a rat model of streptozotocin-induced diabetes. *Convolvulus pluricaulis,* a member of the Convolvulaceae family.1,2This new perspective's significance is closely linked to the interactions between hyperlipidemia, diabetes, and cardiovascular diseases, which are now widely recognized, as is the significance of regulating glycemia and lipid parameters to lower cardiovascular morbidity

and death. Preclinical research has previously demonstrated the efficacy of herbal remedies in this regard by using *Convolvulus pluricaulis* to treat high blood pressure. This impact can be attributed to the reduction of non-esterified fatty acid levels, which are an essential part of the pathophysiology of cardiovascular illnesses.4 Increased levels of plasma lipids trigger the body's natural process of activating the intracellular receptors that control lipid metabolism, storage, and even transport. Numerous research works have pointed out the function of the intracellular receptor known as PPARγ (Peroxisome Proliferator-Activated Receptor γ), which is a part of the nuclear receptor superfamily. Generally, this is recognized as a crucial modulator of adipocyte development and, as a result, of the balance between fat and glucose. Since PPARγ has been shown to inhibit macrophage activation and cytokine production, as well as to have a secondary positive effect on insulin signaling and, ultimately, metabolic control, its significance in adipose tissue as a fundamental regulator of both adipocyte and stromal macrophage function has become abundantly evident. 2,4

Furthermore, PPARγ is increasingly being referred to as an anti-inflammatory gene, which plays a crucial role in controlling inflammation in a variety of illnesses, including multiple sclerosis, ulcerative colitis, acute neurological conditions, such as stroke or spinal cord/brain injury, chronic conditions, such as Parkinson's disease and Alzheimer's disease, and, surprisingly, both diabetes and atherosclerosis.5 PPARγ can be activated by various natural or synthetic ligands, solely because of their role in fat/glucose metabolism; among these are anti-diabetic medications like thiazolidinediones. It is now known that some terpenoids, flavonoids, and alkaloids are among the naturally occurring PPARγ agonists. In fat tissue, the genes PPARγ activate and promote lipogenesis and lipid recovery. However, these plants have shown promise in the field of central nervous system research. cardiovascular action, antiulcer, and anticatatonic qualities; relaxing, neurodegenerative, analgesic, hypolipidemic, immunomodulatory, anxiolytic, antidepressant, antioxidant, and antidiabetic. In addition to hydroxyl cinnamic acid, studies on the phytochemistry of the entire plant have found the presence of glucose, sucrose, phenols, coumarins, flavonoids, and alkaloids.5,6

Taxonomy of *Concolculus pluricaulis*6

1	Kingdom	Planet
2	Sub-kingdom	Tracheobionta
3	Divisnion	Magnoliophyta
4	Class	Dicotyledonae
5	Sub-Class	Asteridae
6	Order	Solanaled
7	Family	Gentianaceae
8	Genus	Convolvulus
9	Speciecs	Pluricaulis

Figure No. 01 Taxonomy

Synonyms

The synonym of *Convolvulus pluricaulis* also has the following synonyms, and these are as follows, and generally these are also known as the different names known in the 5 different states.7,8

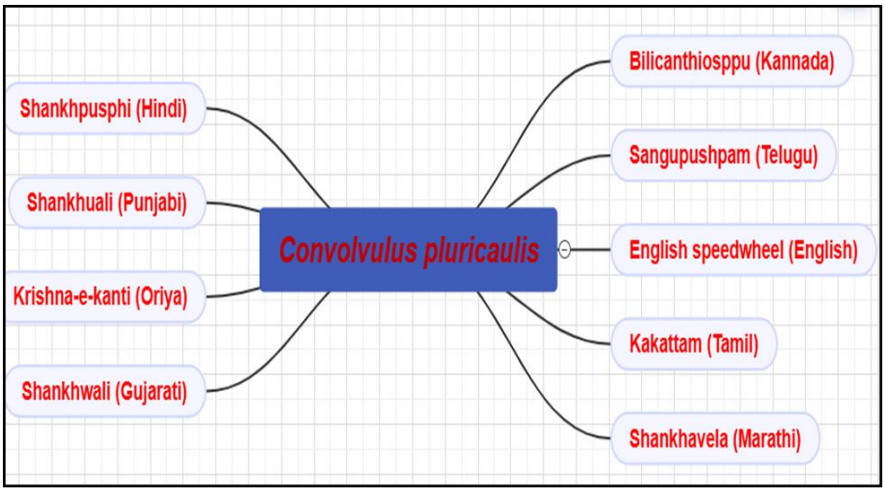


Figure No. 02 Synonym of Convolvulus pluricaulis

Botanical Description

The stem of Shankhpushpi is light green and cylindrical, with noticeable hairy internodes and nodes. Its thickness is 0.1 cm or less. A single-layered epidermis with thick cuticles, unicellular hairs, and a cortex is seen when the stem is examined under a microscope. The plant is divided into two zones: one or two lower parenchymatous layers and two to three higher collenchymatous layers. The leaves are long, round, or oval in shape, with convex and concave midribs. The vascular bundles are made up of four to five layers of parenchymatous cells and contain phloem and xylem components.9

A two-layered palisade, bicollateral vascular bundles, epidermis, and single-cell hairs are all found in the spongy parenchyma on each side of the lamina. With stomatal numbers of 185-247 and 202-238 per sq. mm, respectively, the bottom surface had a stomatal index of 16.9-19.8, while the top layer had a stomatal index of 13.8-17.0. The pale green foliage is It is sharp, petiolate, linear-lanceolate, and has hairy surfaces. They are between 0.2 and 0.5 cm wide and 0.5 and 0.5 cm long. Blooms on the leaf axil might be single or in pairs, white or pink, sessile or sub-sessile. The ovary is superior and bicarpellary. The fruits are rectangular and capsule-shaped, with a coriaceous, pale brown pericarp.9,10

The roots and seeds have a yellowish-brown color and are brown. The root typically contains irregular, rough stem nodules, small secondary roots, branching, cylindrical, and ribbed, in addition to the tiny puberulous seeds. It is 1 to 5 cm long, 0.1 to 0.4 cm thick, and has a yellowish-brown to light brown hue. The cork and major phloem are separated by 10 to 15 layers, giving the root a spherical appearance under a microscope. *Convolvulus pluricaulis* secondary roots are 0.1–0.4 cm thick, 1–5 cm long, and light brown to yellowish-brown in color. The root appears spherical under a microscope, with 10–15 layers separating the primary phloem from the cork.10,11



Figure No. 03 Diagrammatic representation of Convolvulus pluricaulis

Chemical Constituent

The plant has a variety of bioactive compounds that have therapeutic benefits, particularly in terms of improving mental health and brain function. Some of the primary chemical constituents of *Convolvulus pluricaulis* include the following.11

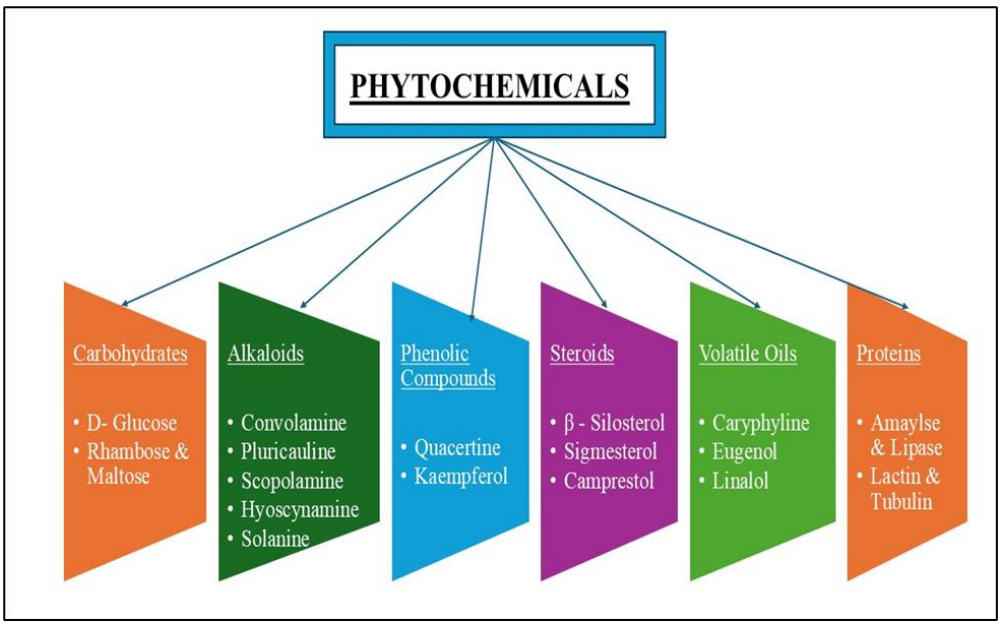


Figure No. 04 Chemical constituent of Convolvulus pluricaulis

These compounds are assumed to be responsible for the plant's putative memory and cognitive function-enhancing properties. Research is ongoing to completely understand the mechanisms and advantages of these substances.

Pharmacological activities of *Convolvulus Pluricaulis*

Neuroprotective Activity

Various studies, such as P. Rachitha, K. et al. in 2018, and SW Bihaqi, et al. in 2009, have also proved that cinnamic acid and convolamine are the active chemical constituents of the *Convolvulus pluricaulis*, and they produce neuroprotective effects at doses ranging from 500 mg/kg to 1000 mg/kg. *Convolvulus pluricaulis* is a versatile herb with numerous traditional therapeutic applications, such as stress reduction and cognitive wellbeing. It is a favorite among gardeners because of its beautiful flowers and ease of growth. This is used to treat a number of CNS conditions, much like any other herbal remedyincluding anxiety, psychosis, dementia, depression, Parkinson's disease, and others.12

Antioxidant Activity

S. Verma, et al. (2012) and P. Agarwal, B. et al. (2014). Their research indicates

that at dosages between (500mg/kg) and (750 mg/kg), these substances demonstrate notable antioxidant benefits. As antioxidants, they aid in lowering oxidative stress, which is a major factor in the development of many illnesses and the aging process. These results highlight *Convolvulus pluricaulis's* potential as a treatment for oxidative reactive stress. Squalene and ascorbic acid, two important chemical components of *Convolvulus pluricaulis*, have been shown to have antioxidant qualities by a number of studies.6,13

Anti-inflammatory Activity

N. Jain, et al. (2021) and S.S. Yadav et al. (2022). According to their research, β-sitosterol has notable anti-inflammatory properties at dosages between (750 mg/kg) and (1000 mg/kg). By lowering the synthesis of pro-inflammatory cytokines and mediators like TNF-α and IL-6, *Convolvulus pluricaulis* seems to regulate inflammatory pathways. These results imply that the plant might be useful as a treatment for inflammatory diseases. According to several researches, β-sitosterol is the main active chemical ingredient in Convolvulus pluricaulis.14,15

Anti-anxiety Activity

K. Sharma, et al. (2009) and R. Sharma, R.K. Singla et al. (2022). In addition to convolamine, *Convolvulus pluricaulis* includes a wide range of other bioactive substances, including glycosides, alkaloids, and flavonoids. Together, these substances provide the plant its wide range of therapeutic benefits. Consequently, *Convolvulus pluricaulis* exhibits potential for the treatment of anxiety and numerous other illnesses. Many studies have shown that Convolamine, a major active constituent in *Convolvulus pluricaulis*, has strong antianxiety benefits, especially at doses ranging from 750 mg/kg to 1000 mg/kg.15,16

Antidepressant Activity

G.L. Gupta, et al. (2022) and P. Agarwal, et al (2014) have shown that the main active chemical constituents of *Convolvulus pluricaulis*, convolidine and convolamine, have strong antidepressant effects at dosages between 1000 mg/kg and 1500 mg/kg. It is thought that these substances work by preventing serotonin from being reabsorbed from the postsynaptic neuron, which raises serotonin levels in the brain. *Convolvulus pluricaulis* may have therapeutic promise as a treatment for depression and related mood disorders, according to this mechanism.17

Anti- epeileptic Activity

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Hepatoprotective Activity

VD Ravichandra, et al. in 2013 and P. Agarwal, et al. in 2014 evaluated these substances have shown hepatoprotective effects, particularly when taken in dosages between 1500 and 2000 mg/kg. They have specifically been demonstrated to protect against hepatic cell damage, confirming the plant's traditional use to maintain liver function and treat liver-related conditions. Kaempferol and squalene are active chemical components of Convolvulus pluricaulis, a plant recognized for its therapeutic potential, according to data presented by a number of researchers.6,19

Antibacterial Activity

S. Vermaet al. (2011) and P. Rachitha, et al. (2019 evaluated the plant's antibacterial properties, which work well at dosages between 1000 and 1500 mg/kg. It is believed that the chemicals' capacity to target the development and integrity of bacterial cell walls a crucial element for bacterial survival is what causes the antibacterial actions.Therefore, since numerous microbes cannot survive without a completely intact cell wall, *Convolvulus pluricaulis* is especially helpful in treating bacterial infections.Numerous studies have demonstrated that *Convolvulus pluricaulis* also includes squalene and ascorbic acid, which are likewise in charge of the antibacterial activity.20

Anti-hypertensive Activity

G Sharma, et al. in 2021 and K Somarathinam, et al. in 2023 suggested doses between 750 mg/kg and 1000 mg/kg produce these effects. Because of its ability to reduce blood triglyceride levels, prevent blood clots in veins and arteries, and demonstrate antihypertensive qualities, linolenic acid in particular has been emphasized as a useful substance for controlling high blood pressure and enhancing cardiovascular health. Numerous research studies have demonstrated that linolenic acid and ascorbic acid are active chemical elements of *Convolvulus pluricaulis*, contributing to its antihypertensive benefits.21

Anti-diabetic Activity

According to P. Agarwal, et al. (2014) and E. Melloni, et al. (2023), *Convolvulus pluricaulis'*s primary chemical constituent, decanoic acid, is essential for its antidiabetic properties. According to the study, blood glucose levels are considerably lowered by extract dosages ranging from 1000 mg/kg to 1500

mg/kg, indicating that it may be a useful treatment for diabetes. Studies continuously show that decanoic acid has a major effect on controlling blood sugar levels, supporting its potential as a treatment for diabetes.21,22

Anti-demential Activity

Numerous researchers have shown that valeric acid is an active chemical component of *Convolvulus pluricaulis*, including B. Sharma, et al. in 2022 and D. Bhowmik, et al. in 2021. According to their research, when given at levels between 1000 and 1500 mg/kg, valeric acid demonstrates antidementia qualities. This collection of research demonstrates the important role that valeric acid plays in generating these positive effects and supports the potential of Convolvulus pluricaulis as a medicinal agent for the treatment of dementia.21,22

Anti-emetic Activity

A.K. Verma, et al. (2011) and P. Kaushik, et al. (2023) are two among the many researchers that have shown that phthalic acid and squalene are active chemical constituents of *Convolvulus pluricaulis*. Their study demonstrates that both substances, at effective dosages ranging from 1000 mg/kg to 1200 mg/kg, contribute to the plant's antiemetic properties. These results highlight *Convolvulus pluricaulis's* therapeutic potential in reducing nausea and vomiting, with squalene and phthalic acid playing important roles in this positive outcome. 22,23

Anti ulcerant Activity

Numerous investigations, such as those conducted in 2023 by P. Agarwal, et al., and in 2022 by D. Bhowmik,et al.in (2021) have verified that β-sitosterol is an active chemical component of *Convolvulus pluricalus*. According to their findings, β-sitosterol exhibits notable antiulcerant properties at dosages between 1000 and 1500 mg/kg. These results demonstrate *Convolvulus pluricaulis's* potential as a therapeutic agent for ulcer treatment, with β-sitosterol being a key component of its gastrointestinal system-protective actions.6,23

Anti-Parkinsonism Activity

Several researchers have shown that valeric acid and Convolvulus pluricaulis are active chemical ingredients that contribute to its antiparkinsonian properties. These researchers include P.K. Perera, et al. in 2021 and V. Ravindranath, et al. in 2006. According to their research, dosages between 750 mg/kg and 1000 mg/kg can effectively result in notable reductions in the symptoms of Parkinson's disease. These results highlight the neuroprotective qualities of valeric acid and *Convolvulus pluricaulis* and highlight their potential as therapeutic agents for the management of Parkinson's disease.24,25

Antihyperlipidemic Activity

Numerous studies have shown that ascorbic acid and linolenic acid are active chemical elements of *Convolvulus pluricaulis* that display antihyperlipidemic activity. These researchers include D. Iyer, et al. in 2023 and P. Agarwal, et al. in 2014. According to their research, the plant may be useful in treating hyperlipidemia because doses between 1000 and 1500 mg/kg successfully reduce lipid levels. These results demonstrate the medicinal advantages of *Convolvulus pluricaulis* in controlling lipid metabolism, with linolenic acid and ascorbic acid being key contributors to its cholesterol-lowering properties.5,6

Analgesic Activity

Numerous investigations have shown that convolamine, a chemical component of *Convolvulus pluricaulis*, has notable analgesic effects. These research studies include those conducted by B. Sharma, et al. in 2014 and R. Sinha, et al. in 2022. Their findings demonstrate the potential of *Convolvulus pluricaulis* as a natural analgesic drug by showing that doses between 600 mg/kg and 1200 mg/kg are effective in reducing pain. These results further confirm the plant's therapeutic usefulness by highlighting convolvamine's role in pain relief. 6,26

Sedative Activity

K. Sharma, et al. in 2009 and B. Sharma, et al. in 2014 explained doses ranging from 1000 mg/kg to 1500 mg/kg effectively create sedative effects, research suggests that the plant may be utilized as a natural cure for anxiety and sleep difficulties. These results demonstrate the important roles that convulvuline and valeric acid play in generating the relaxing effects linked to *Convolvulus pluricaulis*. Numerous researchers have shown that convulvuline and valeric acid are active components of *Convolvulus pluricaulis* that provide sedative effects.26

Discussion

The present review highlights the multidimensional therapeutic potential of *Convolvulus pluricaulis*, a cornerstone herb in traditional Indian medicine. The pharmacological attributes of this plant are largely attributed to its diverse phytochemical profile, comprising alkaloids, flavonoids, glycosides, and essential fatty acids. Its neuroprotective efficacy, observed in several animal studies, suggests significant promise in the management of central nervous system (CNS) disorders such as Alzheimer’s disease, Parkinsonism, anxiety, and epilepsy. Compounds like convolamine and convolidine exert beneficial effects through modulation of neurotransmitter levels, inhibition of oxidative stress pathways, and anti-inflammatory mechanisms. Antioxidant and anti-inflammatory actions were consistently reported at various dosages, supporting the herb’s potential in preventing oxidative cellular damage and chronic inflammatory conditions. The antiulcer, hepatoprotective, and antimicrobial activities suggest its broader

systemic benefits beyond neurological functions. Its antihypertensive, antihyperlipidemic, and antidiabetic effects further indicate a role in metabolic syndrome management. Agronomically, *C. pluricaulis* requires minimal input, making it a sustainable crop for large-scale cultivation, particularly in resource-limited settings. Its drought-resistant nature and adaptability to sandy, alkaline soils provide additional advantages.Despite promising preclinical results, standardization of extracts, dose optimization, and controlled clinical studies remain key to validating its medicinal efficacy. Further exploration into its pharmacokinetics, safety profile, and long-term effects is warranted. Integrating modern analytical tools and molecular techniques will enhance the understanding of its mechanisms of action, paving the way for its inclusion in evidence-based phytotherapeutics.

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